

REMARKS

In the last Office Action, the Examiner withdrew claims 17-35 from further consideration as being directed to a non-elected invention. Claims 1-3 were rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,826,971 to Hirose ("Hirose '971"). Claims 4-6, 10, 12, 13, 15 and 16 were rejected under 35 U.S.C. §103(a) as being unpatentable over Hirose '971 in view of U.S. Patent No. 5,783,830 to Hirose ("Hirose '830"). Claims 7-9 were rejected under 35 U.S.C. §103(a) as being unpatentable over Hirose '971 and further in view of U.S. Patent No. 5,825,035 to Mitzumura et al. ("Mitzumura"). Claims 11 and 14 were rejected under 35 U.S.C. §103(a) as being unpatentable over Hirose '971 and Hirose '830 and further in view of Mitzumura. Additional art was cited of interest.

In accordance with the present response, the specification has been suitably revised to correct informalities and bring it into better conformance with U.S. practice. Independent claim 1 has been amended to incorporate the subject matter of claims 2-3, which have been canceled, and to further patentably distinguish from the prior art of record. Original claims 7 and 8-16 have been rewritten as new claims 36 and 38-45, respectively, to correct informalities, improve the wording, correct instances of indefiniteness, and

bring them into better conformance with U.S. practice. New claims 37 and 47-48 have been added to provide a fuller scope of coverage. Claims 4-6 have been canceled without prejudice or admission. Non-elected claims 15-35 have been canceled without prejudice or admission and subject to applicants' right to file a continuing application to pursue the subject matter of the non-elected claims. A new abstract which more clearly reflects the invention to which the amended and new claims are directed has been substituted for the original abstract.

Applicants request reconsideration of their application in light of the foregoing amendments and the following discussion.

Brief Summary of Invention

The present invention is directed to a method of preparing a sample chip and observing a wall surface of the sample chip.

Various conventional techniques for forming a sample chip and observing a surface of the sample chip are known. For example, as described in the specification (pgs. 1-3), the conventional techniques are complex and expensive to carry out. Additionally, the conventional techniques do not generate sufficient resolution for adequate observation of the surface of the sample chip. As a result, a

comprehensive analysis of the sample chip (e.g., observation of the geometry of the surface of the sample chip) cannot be performed with the conventional techniques.

The present invention overcomes the drawbacks of the conventional art. With reference to the embodiment shown in Figs. 1A-1H, for example, a method of preparing a sample chip and observing a wall surface thereof according to the invention comprises a first step of etching a preselected portion of a sample and an area surrounding the preselected portion of the sample by irradiating the sample with a focused ion beam 2 to form a sample chip 1. Preferably, when the sample has a multi-layered structure made of different materials, a wall surface of the sample chip is gas-assist-etched during irradiation with the focused ion beam 2 so that the wall surface is formed with stepped portions due to differences in the materials of the multi-layered structure of the sample. Thereafter, in a second step, the sample chip is taken out from the sample. In a third step, the wall surface of the sample chip is observed with a scanning probe microscope. By this method, the geometry of the surface of the sample chip and its three-dimensional distribution thereof can be observed with an atomic level resolution.

Traversal of Prior Art Rejection

Claim 1 was rejected under 35 U.S.C. §102(e) as being anticipated by Hirose '971. Applicants respectfully traverse this rejection and submit that amended independent claim 1 recites subject matter which is not identically disclosed or described by Hirose '971.

Amended independent claim 1 is directed to a method of preparing a sample chip and observing a wall surface thereof. Claim 1 requires a first step of etching a preselected portion of a sample and an area surrounding the preselected portion of the sample by irradiating the sample with a focused ion beam to form a sample chip having a wall surface formed with stepped portions, a second step of taking out the sample chip from the sample, and a third step of observing the wall surface of the sample chip with a scanning probe microscope. No corresponding combination of steps is disclosed or described by Hirose '971.

Hirose '971 is directed to a method of fabricating a sample chip to be analyzed. The sample chip is formed by etching a semiconductor wafer using a focused ion beam. The sample chip is then taken out from the semiconductor wafer and analyzed. However, Hirose '971 does not disclose or describe the formation of the sample chip with a wall surface formed

with stepped portions, as recited in amended independent claim 1. As described in the specification and reiterated herein, by the stepped portions formed in the wall surface of the sample chip, the geometry of the surface of the sample chip and its three-dimensional distribution can be observed with an atomic level resolution using a scanning probe microscope.

Since Hirose '971 does not disclose or describe the stepped portions of the wall surface formed in the first step recited in amended claim 1, it does not anticipate amended claim 1. Furthermore, Hirose '971 does not suggest the claimed subject matter and, therefore, would not have motivated one skilled in the art to modify Hirose's method to arrive at the claimed invention.

In view of the foregoing, applicants respectfully request that the rejection of claim 1 under 35 U.S.C. §102(e) as being anticipated by Hirose '971 be withdrawn.

Applicants respectfully submit that newly added claims 36-48 also patentably distinguish from the prior art of record.

New independent claims 36, 40 and 43 are directed to a method of preparing a sample chip and observing a wall surface thereof. Each of new independent claims 36, 40 and 43 recites a combination of steps that is not disclosed or suggested by the prior art of record, including the formation

of a sample chip by irradiating a sample with a first focused energy beam and the subsequent irradiation of a wall surface of the sample chip with a second focused energy beam prior to observation of the wall surface with a scanning probe microscope.

New dependent claims 37-39, 41-42 and 44-45 depend on and contain all of the limitations of new independent claims 36, 40 and 43, respectively, and, therefore, distinguish from the prior art of record at least in the same manner as claims 36, 40 and 43.

Moreover, there are separate grounds for patentability of several of the new dependent claims.

Claim 37 includes the additional limitation that the second step further comprises the step of securing the sample chip to a sample chip holder after the sample chip is picked-up from the sample so that the wall surface of the sample chip etched in the third step and observed in the fourth step faces in an upward direction. No corresponding step is disclosed or suggested by the prior art of record.

Claims 38, 41 and 44 include the additional limitation that the second focused energy beam is an argon ion beam. Again, no corresponding step is disclosed or suggested by the prior art of record.

Claims 39, 42 and 45 are directed to the step of processing the sample chip to form stepped portions in the wall surface of the sample chip. No corresponding step is disclosed or suggested by the prior art of record as set forth above for amended independent claim 1.

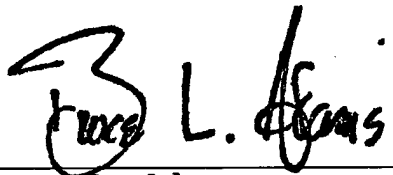
New independent claim 47 is also directed to a method of preparing a sample chip and observing a wall surface thereof. Claim 47 requires the steps of providing a sample having a multi-layered structure made of different materials, irradiating the sample with a focused energy beam to form a sample chip while a wall surface of the sample chip is gas-assist-etched so that the wall surface is formed with stepped portions due to differences in the materials of the multi-layered structure of the sample, taking out the sample chip from the sample, and observing the wall surface of the sample chip having the stepped portions with a scanning probe microscope. No corresponding combination of steps is disclosed or suggested by the prior art of record.

In view of the foregoing amendments and discussion,
the application is believed to be in allowable form.
Accordingly, favorable reconsideration and allowance of the
claims are most respectfully requested.

Respectfully submitted,

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April 3, 2006

Date